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EXAMINER

METZMAIER, DANIEL S

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Claims 1-3, 6-31, 33-48, and 60-64 are pending.

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 1-11, 15-31, 33-41, 45-46 and 48, and the species, $\text{La}_{0.7}\text{Y}_{0.3}\text{Sc}_3(\text{BO}_3)_4$, in the reply filed on 03 December 2007 is acknowledged.

The requirement is still deemed proper and was made FINAL in the Action mailed 26 February 2008.

Claim Objections

2. Claims 3 and 12-14 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 3 and 12-14 include species that are not provided for in claim 1 for the lanthanides.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3, 12-14, 18 and 62 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 3 and 12-14, it is unclear how M or M' could possibly be La, Ce (cerium), Sc or Pr since they are no longer provided for in claim 1.

It is unclear if the formula set forth in the nonlinear optical material or applicants intend all nonlinear optical materials and the formula is merely a preferred species.

Claim 62 is indefinite since it depends on itself.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 18-27, 31, 33-37, 41-43, 60 and 63-64 are rejected under 35 U.S.C. 102(b) as being anticipated by Gruber et al, "*Spectroscopic Properties of nonlinear NdSc₃(BO₃)₄*", Journal of Applied Physics, Vol. 87, No. 10, 15 May 2000. Gruber et al (page 7159, Introduction) discloses LaSc₃(BO₃)₄ having spectroscopic properties as laser host materials that reads on the claimed borate crystals. See also page 257, which discloses PrSc₃(BO₃)₄ having a R32 structure.

Please see Gruber et al at page 7159, II. Experimental Details, wherein the crystals were mounted on glass fiber with epoxy. Said disclosure reads on the composition claims.

In claim 19, M and M' may be La.

7. Claims 19-22, 24, 60 and 63 are rejected under 35 U.S.C. 102(b) as being anticipated by Masaki et al, US 5,879,803. See figure 1 and column 3, lines 10-15.

Masaki et al discloses $\text{Sc}_2\text{O}_3 + \text{ScBO}_3$. Since M and M' can be Sc, the structure reads on $\text{Sc}_4(\text{BO}_3)_4$ or as a normalized structure ScBO_3 .

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-3, 6-8, 11-15, 17-28, 31-38, 41-45, 47, and 60-64 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kuz'min O.V. et al. "*Cerium scandium borate - an active nonlinear medium for diode-pumped lasers*", Quantum Electronics, 28(1) 1998, 50-54. Kuz'min O.V. et al (page 50, Introduction et seq) discloses non-linear optical materials composed of crystals of double borates having the formula $\text{RX}_3(\text{BO}_3)_4$, wherein R = Y, La or

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lanthanides and $X = \text{Al, Ga, Sc}$. Kuz'min O.V. et al (page 53) discloses the formation of layered materials for use in lasers.

Kuz'min O.V. et al clearly envisages compounds, compositions and lasers employing $\text{LaSc}_3(\text{BO}_3)_4$, $\text{YSc}_3(\text{BO}_3)_4$ or $\text{LnSc}_3(\text{BO}_3)_4$, wherein Ln are mixed or sole lanthanides. Kuz'min O.V. et al (page 50, right column) disclose mixed lanthanide scandium borates, wherein the lanthanides (Ln) sum to a subscript of 1 in the formula $\text{LnSc}_3(\text{BO}_3)_4$, wherein Ln are mixed lanthanides.

To the extent that Kuz'min O.V. et al differs from the claims in the sufficiency of the disclosure as claimed, it would have been obvious to one of ordinary skill in the art at the time of applicants' invention to employ $R = \text{La, Y}$ or mixed La and Y with $X = \text{Sc}$ as an obvious choice for the advantage of forming non-linear optical crystals for laser applications as taught in the Kuz'min O.V. et al reference.

11. Claims 1-3, 6-7, 11-22, 24-27, 31, 33-37, 41-47 and 60-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Durmanov S.T. et al, "*Binary rare-earth scandium borate for diode-pumped lasers*" Optical Materials, 18, (Nov-2001, 243-284. Durmanov S.T. et al (tables 2 and 4) discloses compounds of $\text{La}_{0.85}\text{Pr}_{0.21}\text{Sc}_{2.94}(\text{BO}_3)_{3.8}$ and $\text{LaSc}_{2.85}\text{Yb}_{0.15}(\text{BO}_3)_{3.8}$. Durmanov S.T. et al (page 280-281) discloses Er and Yb dopes LSB crystals having applicability in lasers.

To the extent the Durmanov S.T. et al differs from the claims in the sufficiency of the disclosed compounds, compositions, devices, and/or properties, Durmanov S.T. et al discloses materials which are the same or substantially the same as those instantly claimed and would be expected to have the same or substantially the same properties.

A compound and all of its properties are generally inseparable. *In re Papsech*, 315 F2d. 381, 137 USPQ 43, (CCPA 1963).

Furthermore and to the extent the ratios of elements vary slightly from those claimed, See also MPEP 2144.05(I) wherein it sets forth, “A *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).”

Durmanov S.T. et al (page 277) discloses a laser diode setup, which would have included a second material as part of the setup.

12. Claims 1, 3, 6-8, 12-15, 19-22, 24-28, and 60-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huguenin et al, US 6,238,593. Huguenin et al (abstract; column 3, lines 15 et seq; examples and claims) disclose lanthanide or rare earth borate materials and the use of said materials (column 5, lines 32-44) in well known silk-screen printing operations for use in luminescent devices, which would clearly and/or implicitly would require a second material, *e.g.*, binder and/or coupling agent. Huguenin et al (column 3, line 16) clearly contemplates mixtures of rare earth materials in the disclosure of “Ln representing at least one rare-earth”. Huguenin et al (column 4, lines 1-5) discloses the rare-earths that may be used as Ln include Y, Gd, La, Lu and Sc.

Huguenin et al differs from the claims in the sufficiency of the disclosure of the ratios defining the mixed rare-earths claimed.

Huguenin et al (column 4) disclose varying the rare-earth combination for the advantage of varying the emission intensity at various wavelengths.

It would have been obvious to one of ordinary skilled in the art at the time of applicants' invention to employ mixtures of rare-earths including lanthanum (La) and/or scandium (Sc) in the disclosed luminescent compounds and compositions disclosed in the Huguenin et al reference for their luminescent properties.

Allowable Subject Matter

13. Claims 9-10, 29-30, 39-40 and 48 are allowable over the prior art.
14. Claims are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

15. Applicant's arguments filed 27 July 2008 have been fully considered but they are not persuasive.
16. Applicants (pages 8 and 9) assert the Gruber et al and Durmanov S.T. et al references cannot read on the instant claims since the instant claims are directed to higher order borates rather than the binary compounds of the prior art. Applicants further argue the basis of the rejections is predicated on the fact that the subscripts may be zero. this has not been deemed persuasive since said subscripts = zero forms only part of the basis. Applicants claims also provide M and M' in the formulas may read in some cases La (lanthanum) and/or Sc (scandium).

17. Applicants (page 9) assert the arguments presented for the Gruber et al and Durmanov S.T. et al references for the rejection as anticipated by the Masaki et al reference. This has been addressed above. Applicants' arguments are not commensurate with their claims.

18. Applicants' (pages 9 and 10) arguments regarding Kuz'min that a *prima facie* case of obviousness has not been presented has not been deemed persuasive since Kuz'min clearly contemplates mixtures of rare earth borates and applicants have not shown a particular claimed higher rare earth borate to be critical or unexpected over the prior art.

19. Applicants (page 10) assert Durmanov S.T. et al and Kuz'min employ the Czochralski technique to produce crystals and the materials of claim 1 may not be produced by said technique. Applicants arguments are conclusionary and applicant has not provided evidence of said conclusion. To the extent applicants wish to assert the crystallization is unpredictable, said predictability would be used to evaluate the instant scope of the claimed subject matter.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel S. Metzmaier whose telephone number is (571) 272-1089. The examiner can normally be reached on 9:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David W. Wu can be reached on (571) 272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**/Daniel S. Metzmaier/
Primary Examiner, Art Unit 1796**

DSM